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CASE REPORT

Proximal ureteric disruption following blunt abdominal trauma

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Introduction

Ureteric injuries arising from noniatrogenic blunt trauma are uncommon. Their incidence is less than 1% of all genitourinary injuries.[5,14] They typically occur in the pediatric population at the level of the ureteropelvic junction (UPJ) or within 4 cm distal to the UPJ. The even less common proximal ureteric injury is usually associated with a transverse process fracture.[1,3,11] When present, blunt ureteric trauma is often associated with multisystem life-threatening injuries. Because of its rarity and the urgency to address the associated life-threatening injuries, diagnosis of ureteric injuries is often delayed. We present a rare case of an adult female with lateral abdominal musculature disruption, multiple bowel injuries and an isolated, complete ureteric transection 6 cm distal to the UPJ following a high velocity motor vehicle accident.

Case report

A previously healthy 26-year-old female was a restrained driver in a rollover high-speed motor vehicle accident. Following prolonged extrication, the patient had temporary loss of consciousness and complained of abdominal pain. She presented to a peripheral hospital with stable vital signs and a Glasgow Coma Scale of 15. Her physical examination was remarkable for lower abdominal and pelvic ecchymoses only. Urine analysis was significant for microscopic hematuria. Serum hematologic and biochemical indices were within normal limits. No acute brain injury was noted on computed tomography (CT). Chest, abdomen and pelvic radiographs showed a left 11th rib fracture, a small left pneumothorax and free air under the diaphragm. Delayed CT imaging of the abdomen and pelvis revealed a subcutaneous right flank hematoma, enhancement of the jejunum, ileum, and ascending colon and extravasation of contrast along the course of the right ureter. The patient was transferred to our facility for further management. A repeat CT abdomen and pelvis without and with contrast was obtained at our institution due to incomplete transfer of the original CT films from the peripheral facility. It revealed disruption of the external oblique, internal oblique and transversus abdominal musculature above the iliac crest, confirmed the small bowel and ascending colon injuries and showed extensive extravasation of contrast from the right proximal ureter with non-visualization of the ureter below the level of L4 (Fig. 1a—c). An abdominal radiograph demonstrated extravasation and non-continuity of the right ureter (Fig. 2).

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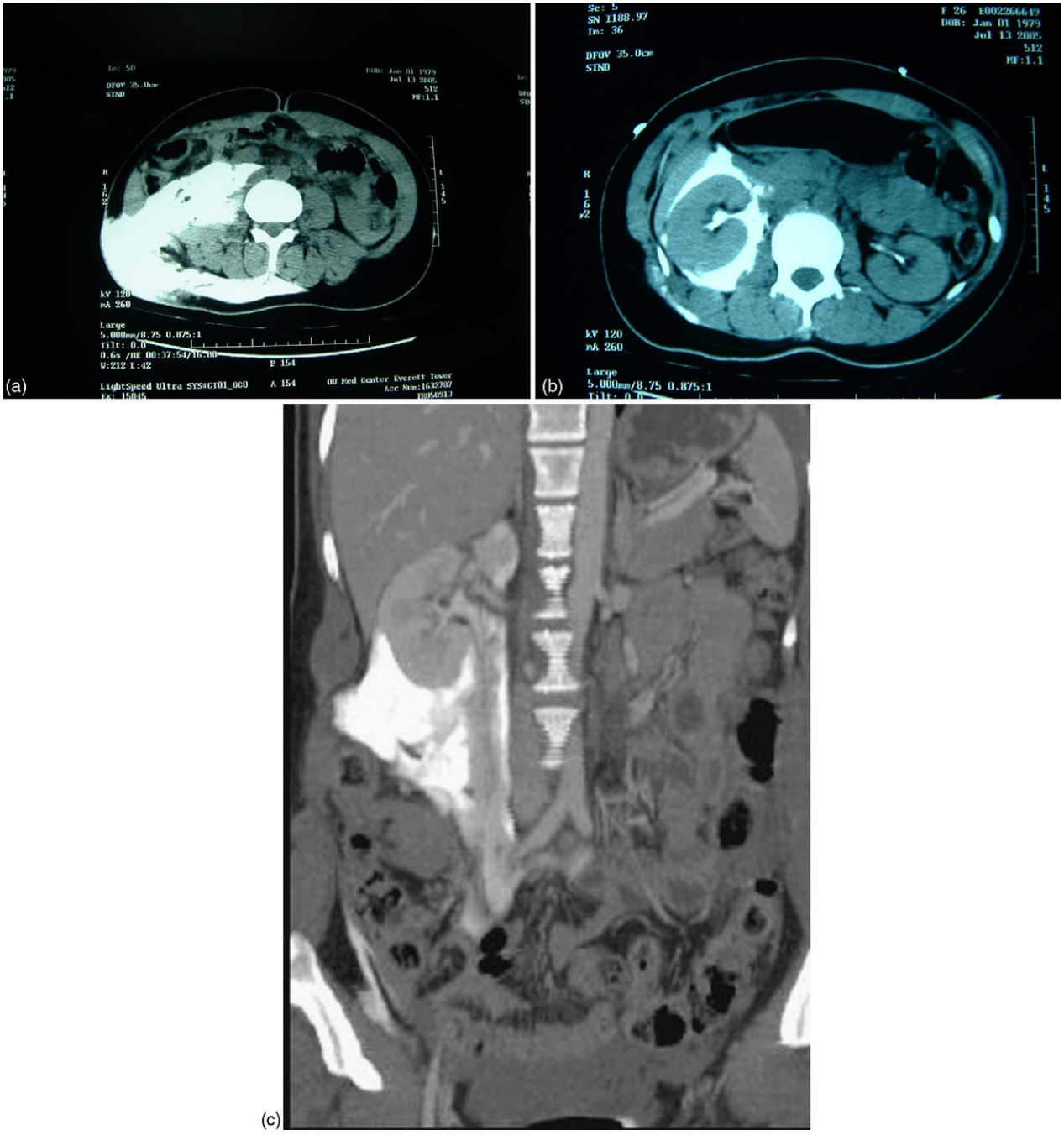

Figure 1 Computed tomography of abdomen and pelvis with delayed intravenous contrast. Transverse sections (a and b) and sagittal reconstruction (c).

An exploratory laparotomy was performed by the trauma team. The patient was positioned in dorsal lithotomy to allow for perineal access. A left thoracostomy and tube placement was performed for her pneumothorax. Intraoperative findings included multiple bowel injuries that required a right hemicolectomy, two small bowel resections with stapled anastomoses, and serosal repair of the descending colon. Following, a retroperitoneal exploration was performed by the urology team. A complete ureteric transection of the right proximal ureter was identified approximately 6 cm distal to the UPJ. There was no evidence of renal or hilar injuries. After cystoscopy and retrograde ureteropyelography, the ureter was repaired with a primary ureteroureterostomy over the double-J stent (Fig. 3). The patient's midline wound was left open and a temporary abdominal closure device was placed over the peritoneal contents. The patient required subsequent surgery for

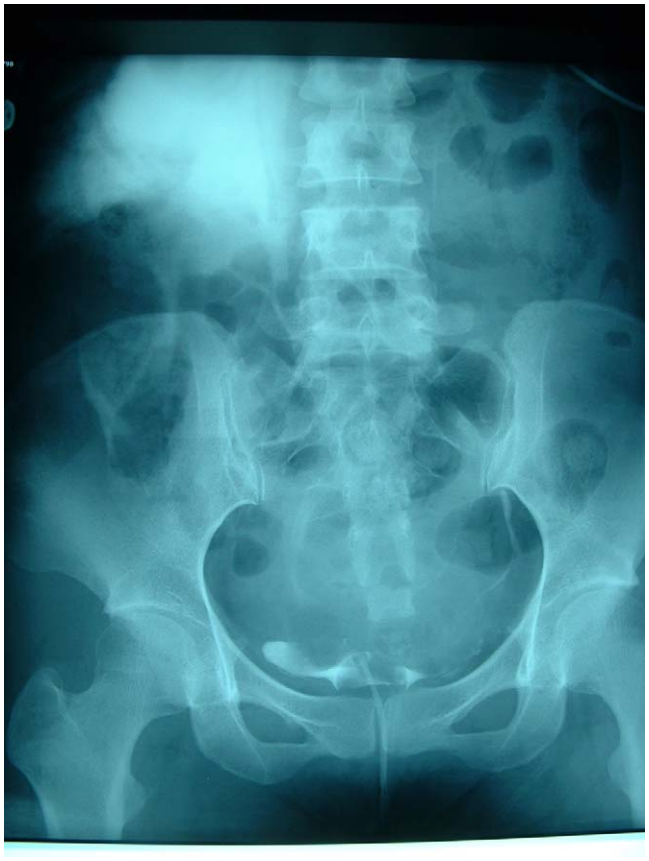

Figure 2 Abdominal radiograph showing contrast extravasation and non-visualization of right distal ureter.

Figure 3 Retrograde ureteropyelography of the right collecting system following repair. Arrow indicates level of transection.

ileocolostomy, closure of the lateral abdominal wall defect and fascial closure. A post-operative CT confirmed the absence of fluid and proper stent position. The patient clinically improved and subsequently was discharge from the hospital. The double-J stent was removed 6 weeks post-surgery. Follow-up intravenous urography (IVU), 4 weeks post-stent removal, demonstrated a patent right ureter without evidence of stricture or hydroureteronephrosis.

Discussion

Blunt ureteric injuries are rare as the ureter is well protected in the retroperitoneum by the psoas muscle and bony pelvis. It is fixated at the UPJ and ureterovesical junction. The mechanism of the ureteric avulsion is postulated to be due to hyperextension of the body causing the kidney to move cephalad and the ureter to be compressed onto a bony prominence such as a vertebral transverse process (which may be fractured).[16] When a ureteric injury is present, the most common site of avulsion is the UPJ, with proximal and distal ureteric avulsions being much less common.[1,11] The right ureter is more commonly injured, the reason for which is unknown.[11] Few descriptions of bilateral injuries exists.[11,18] UPJ disruptions tend to be associated with rapid deceleration blunt trauma, and often occur in pediatric population due their flexible bodies.[1–4,7,8,10–12,15–18] With a higher incidence of high-velocity motor vehicle accidents, the incidence of ureteric injuries in adults have increased.[1,3,11] Our patient was an adult with a ureteric injury 6 cm distal to the UPJ with no associated vertebral body or transverses process fractures.

Historically, 50% of blunt ureteric injury diagnoses are delayed 36 h or longer.[3,8,15,17] These studies, however, predated the universal availability of CT imaging, which may make it easier to identify a ureteric injury. Unfortunately, 80% of ureteric injuries are still diagnosed at least 24 h late despite obtaining spiral CT imaging. The problem lies in either a failure to obtain imaging with intravenous contrast or not allowing enough time for the contrast to reach the distal ureter.[10] The gold standard is a CT of the abdomen and pelvis without and with intravenous contrast and 5–8 min delayed sections.[5,10] Our patient was promptly diagnosed using this imaging modality. As well, a delayed abdominal radiograph demonstrated contrast extravasation resulting from the ureteric disruption. In circumstances where time cannot be afforded for CT imaging, a one-shot IVU on the operating table can help elucidate a ureteric injury.

Another factor contributing to a delay in diagnosis of a ureteric injury is the unreliability of its clinical symptoms. Unlike renal injuries, a third of ureteric injuries do no have gross or microscopic hematuria.[3,4] Even though most blunt ureteric injuries are associated with severe multi-organ injuries, only half are associated with hypotension.[5] Such was the case with our patient, who only had microscopic hematuria on urine analysis and had no episodes of hypotension.

The most frequent reason for a delay in diagnosis of ureteric injury is attributed to the severity of associated injuries. The management of the associated multi-system, life-threatening injuries tends to take priority over a ureteric injury. Diagnosis is often not made until several days later when the patient develops persistent fever or sepsis, flank pain, expanding flank mass, urinoma, or fistula formation. A high index of suspicion is the key to making a prompt diagnosis of a blunt ureteric injury, especially in a trauma that involves rapid deceleration, multi-system injuries, flank pain/ecchymosis, and hematuria.[2,5,13] A delay in diagnosis and repair can lead to increased morbidity or loss of the renal unit. McGinty et al. demonstrated the importance of immediate recognition of ureteric injuries, reporting a 32% incidence of nephrectomy compared to 4.5% when ureteric injuries were diagnosed immediately.[9]

The management of ureteric trauma is usually surgical repair. Ideally, the repair should be immediate ureteroureterostomy with debridement of devitalized tissue, a tension-free anastomosis, and placement a double-J ureteric stent.[6] However, partial transections can be managed with either watchful monitoring or ureteric stenting for 6–8 weeks.[7,13]

Ureteric injury resulting from blunt trauma is uncommon. When present, it tends to be associated with multi-system injuries that can be life-threatening, obfuscating the genitourinary diagnosis. A high index of clinically suspicion is essential to establish the diagnosis in a timely manner. Once the appropriate imaging studies are performed and the diagnosis is made, the ureteric injury can easily be repaired and subsequent morbidity is greatly reduced.

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